Comments to the Office on Environmental Health Hazard Assessment on "Draft Framework and Tool for Evaluating California's Progress in Achieving the Human Right to Water"

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The full extent of California's unsafe drinking water problem is difficult to grasp. The state has made some recent strides in compiling data on communities with drinking water safety violations and drought-related shortages, but more work is needed to help scope solutions, prioritize actions, and track progress. Research in this area at the PPIC Water Policy Center has focused on understanding the extent of drinking water quality and supply vulnerabilities, and highlighting gaps in funding and information.[1] We are encouraged by the Office on Environmental Health Hazard Assessment's (OEHHA) efforts to advance understanding through the "Draft Framework and Tool for Evaluating California's Progress in Achieving the Human Right to Water." In these comments, we highlight opportunities to build an even more effective framework for measuring progress. We appreciate the opportunity to share these observations, and would be happy to follow up with the OEHHA team if that would be helpful.

Overview of comments

The OEHHA proposal focuses on a suite of metrics to track performance of community water systems. These systems have 15 or more service connections, are regulated under the Safe Drinking Water Act, and serve the vast majority of the state's residents. In these comments, we first suggest some ways to refine the metrics on community water systems. We then propose ways to incorporate other types of tracking in the framework. In particular, we suggest tracking some issues related to residents served by "state small" water systems (serving 5-14 homes) and domestic wells (serving fewer than 5 homes)—many of whom also face vulnerabilities. We also propose including overall metrics to track the state's progress in meeting the objectives of ensuring safe drinking water for all Californians.

1. Framework and Tool for Community Water Systems

OEHHA proposes a holistic approach for evaluating community water systems, with metrics in three categories—quality, accessibility, and affordability. This will facilitate tracking individual systems across a spectrum of issues, and make it possible to compare performance across systems. We have several suggestions on ways to strengthen tracking within these three categories. We also suggest creating a fourth category—institutional capacity—building on metrics now included in the accessibility category.

Water quality

The water quality category has the largest number of indicators (7), measuring both non-compliance with maximum contaminant levels (MCL) and potential exposure levels for a large number of contaminants. The OEHHA team drew on a historical data from 2008−16 to develop the framework. Proposed metrics include the number of contaminants for which there have been MCL violations, along with associated high exposure levels; the estimated duration of non-compliance and high exposure; and flags for cases where the violations and high exposure episodes are for contaminants considered acute (e.g., microbial contaminants and nitrate). There is also a flag for data availability on water quality sampling.

These are all important dimensions of the water quality problem. Here are some suggestions for bolstering the tool's ability to track progress:

- **Use a single state tracking system for drinking water quality.** It is unclear how the tracking system proposed by OEHHA would relate to the Human Right to Water (HR2W) portal on the State Water Board's website, which provides monthly updates on systems that are out of compliance with one or more

[1] See the list of references at the end of this document. For an overview of water quality and supply issues and policy options, see Hanak et al. (2018). For issues related to funding, see Hanak et al. (2014), Hanak (2015a) and Sencan and McCann (2019). For an overview of recent policy reforms, see Bostic and Chappelle (2018), McCann and Hanak (2016), and McCann and Chappelle (2018). For a discussion of data challenges and solutions, see Jezdimirovic et al. (2018). For a discussion of drought mitigation options, see Escriva-Bou (2019) and Mount et al. (2018). And for a detailed discussion of safe drinking water issues in the San Joaquin Valley, see Hanak et al. (2019).

MCLs. The dataset used by the OEHHA team has the advantage of going back further in time (to 2008, versus 2012 for HR2W) and including microbial contaminants (currently omitted from HR2W). The tool proposed by OEHHA is also much easier to understand than HR2W, which contains a lot of information in spreadsheets that are difficult to manipulate. On the other hand, the HR2W dataset has the advantage of being current (updated monthly). To avoid confusion and facilitate both policy maker and public understanding, we strongly recommend that the state develop and use a single, consistent portal for tracking drinking water quality issues in a transparent, easily understood way.[2] This may require integrating the datasets and keeping the best of each for display in the tool.

- **Include a flag for current compliance status.** The OEHHA team's proposal to use historical information to track duration of high potential exposure and time out of compliance is very valuable, as it facilitates identification of systems that are chronically unable to meet safe drinking water standards. But to track the state's progress toward meeting the human right to water, it is also important to report current compliance status. Otherwise, systems for which problems have been resolved will still appear as having unsafe drinking water, and systems experiencing new safety violations will not appear to have problems. Ideally, the system would report both the number of contaminants for which there are current violations, and also flag whether any are acute. As noted above, more up-to-date information is available in HR2W, so this is just a matter of integrating this more recent data.
- **Consider consolidating some metrics for exposure and non-compliance.** We appreciate OEHHA's effort to distinguish between MCL violations and the associated exposure levels. In practice, however, there is likely to be a fair amount of overlap—particularly for measures of acuteness and duration of high exposure and non-compliance. (See for instance the summary table for a hypothetical system on p. 36 of the draft.) In summary dashboards that provide high-level comparisons of systems (e.g., Figure 10 on p. 35 of the draft), such repetition can be misleading, effectively double-counting the same indicators. We therefore recommend including single measures of duration and acuteness of MCL violations.
- **Develop a graphical interface.** It would be very valuable to incorporate a graphical interface that can disaggregate cumulative indicators (e.g., when there are violations for multiple contaminants) and make it possible to look at trends over time for each system. One useful model is the EPA's ECHO data portal. If the state agencies do not have staff available to build such an interface, this would be an appropriate task for an outside vendor.

Water accessibility

This category now includes two types of indicators: a water systems' physical ability to provide water, and its institutional ability. Both issues are vital to ensuring safe drinking water for all California residents. As described below, we propose breaking out the institutional metrics into a separate category.

For physical ability to deliver water, the OEHHA team proposes a single indicator: source water diversification. This identifies a system's main source of water, and how many back up sources a system can use in the case of emergency. The most vulnerable systems would be groundwater-only systems with a single well, and the least vulnerable would be those with multiple surface water intakes or combined surface and groundwater systems. We agree that this is a good general indicator of physical vulnerability of supply shortages, which is readily available in reporting data. We also suggest including two additional indicators:

- **Include an indicator of groundwater well vulnerability.** As demonstrated by the last drought, wells have different levels of risk depending on their depth and the elevation of the groundwater table. An indicator measuring the difference between the well depth and the groundwater table depth could be used to track the vulnerability of the groundwater wells. The larger the distance, the safer the well becomes. By incorporating information on well depths and groundwater levels, the state can gain a more robust understanding of the risks of wells running dry, particularly during lengthy droughts. This indicator would be especially important in groundwater-only depending systems. Potential data sources include

[2] See Jezdimirovic et al. (2018).

facility reports available through the Safe Drinking Water Information System (SDWIS), the Department of Water Resources' well completion and well level databases, and groundwater sustainability agencies.[3]

- **Include a flag for past accessibility issues.** Another useful metric could be a flag for systems that experienced accessibility issues in the past. As an example, roughly 150 community water systems sought emergency assistance from the State Water Board to shore up their supplies during the latest drought.[4] The inclusion of this element could help the state identify the water systems that face chronic accessibility issues. Over time, it would be valuable to fold in drought vulnerability indicators to be developed as part of the rural drought planning effort the Department of Water Resources is leading with a County Drought Advisory Group.

Institutional capacity

We recommend evaluating institutional capacity as a separate component—rather than as an element of water accessibility—because it influences a system's ability to address both water quality and accessibility/supply challenges.

The OEHHA team proposes two indicators. The first (called "institutional capacity" in the draft) is a combined measure of economies of scale (system size) and financial capacity (socio-economic status of the customer base): small systems with economically disadvantaged residents would be classified as most vulnerable. The second (called "managerial capacity") is the number of monitoring and reporting violations the system experiences for drinking water quality. This is a valuable warning sign of a system's vulnerability to experience more serious public health violations (with MCL exceedances) in the future.

We suggest several changes:

- **Break the "institutional capacity" variable into two components.** Although we agree that small systems with disadvantaged populations are the most vulnerable, small systems in general are inherently more vulnerable given their lack of economies of scale. Having one variable that flags system size, and a separate variable that flags the financial capacity of the population would be useful. (Size information is also more widely available.)
- **Add a field flagging whether the system has received state or federal funding support.** It could be valuable to track whether the system has had the capacity to seek and receive financial support to address its problems.

Water affordability

As the OEHHA team notes, affordability is an important element of ensuring that all Californians have access to safe drinking water, but also one of the most difficult to track with available data, especially for smaller systems.[5] The draft proposes three indicators: (1) the ratio of the system's charges for an essential volume of water[6] (herein EVW) to its median household income; (2) the ratio of the system's charges for EVW to the county's poverty income threshold; and (3) the ratio of the system's charges for EVW to half the county's poverty income threshold.

We suggest two changes:

- **Use a single ratio of system charges to the county poverty income threshold.** Because the two proposed ratios of system charges to county poverty income thresholds are simply multiples of each other, including both provides no additional information. It also introduces repetition, which is undesirable when making cross-system comparisons. (It also bears noting that given the considerable diversity of

[3] See Fencl, Amanda, Rich Pauloo, Alvar Escriva-Bou and Hervé Guillon. 2018. "Eastern San Joaquin Valley and other CA drinking water supplies at risk in the next drought" California Water Blog. November 12.
[4] See Mount et al. (2018) (Figure 3).
[5] For a discussion of water affordability challenges during drought, see Hanak (2015b).
[6] This value is assumed to be 6 hundred cubic feet (HCF) per month, or roughly 50 gallons per person per day for a household of three persons. The average household size in California in 2015 was 2.9 persons. This is slightly lower than the provisional standard for indoor per capita use in the state's new Making Water Conservation a Way of Life framework (Assembly Bill 1668 and Senate Bill 606, 2018).

household incomes across communities—especially in the state's large, populous counties—this measure could be quite misleading.)

- **Include information on whether the utility has a lifeline rate program.** Many of the state's urban and suburban water utilities have lifeline rate programs for low-income customers. Including a flag for the existence of such a program—and possibly other information about its characteristics—could be useful. The tool could draw on information collected as part of the State Water Board's recent work with UCLA on affordability issues.

2. Tracking Progress on "State Smalls" and Domestic Wells

Data gaps are much more severe for the very small water systems and domestic wells that are not regulated under the Safe Drinking Water Act. Nevertheless, residents served by these systems are also at risk of experiencing both water quality and supply problems, and it is important to make progress in understanding their vulnerabilities and finding solutions. We therefore suggest that the framework seek to track the status of key information about these systems:

- **Summarize existing data about domestic wells and state-small water systems by county, and provide periodic updates.** Metrics could include number of wells in use, whether there is information about water quality, whether there were supply emergencies during the last drought, use of state/federal funds to address gaps, and whether a drought mitigation plan is under development as part of the local groundwater sustainability plan or the rural drought planning effort described above. Counties could be engaged as partners in providing these updates, given their regulatory role over state smalls and their frontline role in helping to address supply vulnerabilities for residents served by domestic wells. Various academic partners could also be engaged, given their role in building field-level understanding of quality and supply vulnerabilities.[7]

3. Tracking Progress at the State Level

To enable both policy makers and the public to track California's progress in addressing the safe drinking water crisis, the tool should include an aggregate overview of the performance of water systems over time—tracking progress and flagging when problems are addressed. It should also summarize key indicators of state action, given the state's important role in helping to resolve local problems.[8]

- **Include a dashboard of aggregate statistics on water systems.** This dashboard should provide a big picture overview of key statistics about community water systems, such as number of systems of out compliance, populations served by these systems, and the change in these numbers over time. Breakout graphics—as suggested above for individual water systems—could display further details, such as trends in violations for different types of contaminants, regional hot spots, etc. Summary statistics on state smalls and domestic wells could also be included. To improve understanding of the public health issues at stake, the final dashboard could also link to the State Water Board's fact sheets on groundwater contaminants, which provide useful health summaries.
- **Include key metrics on state actions.** This could include tracking progress on important initiatives, such as the number of physical and administrative consolidations of vulnerable systems over time[9], the number of systems that are receiving technical and financial support, and the funds disbursed for safe drinking

[7] For instance, Ransom et al. (2017) provide estimates of nitrate concentration in shallow domestic wells across the Central Valley (Katherine Ransom, Bernard Nolan, Jonathan Traum, and Claudia Faunt. 2017. "A Hybrid Machine Learning Model to Predict and Visualize Nitrate Concentration Throughout the Central Valley Aquifer, California, USA." *Science of the Total Environment* 601-602:1160-1172). Fencl et a. (2018) provide a way to anticipate vulnerabilities of shallow drinking water wells to drought-related shortages (Amanda Fencl, Rich Pauloo, Alvar Escriva-Bou, Hervé Guillon. 2018. "Eastern San Joaquin Valley and other CA drinking water supplies at risk in the next drought." California Water Blog. November 12, 2018.

[8] See Chappelle and Hanak (2016).

[9] See Bostic and Chappelle (2018).

water from state and federal funds.[10] Some of this information is available on agency websites, but it would be very valuable to include it in one place, in an easily accessible and understandable format.

[10] For recent legislation, see McCann and Hanak (2016) and McCann and Chappelle (2018). For discussions on bond spending and budgeting, see Sencan and McCann (2019).

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